

Louisiana Standards for Water Works Construction, Operation and Maintenance Committee

Subcommittee Report

Part: Part 7

Report Date: Monday, April 14, 2014 @ 9:00 AM

Chair: James A. Hagan, Jr., P.E., American Society of Civil Engineers

Members: Rusty Reeves, Louisiana Rural Water Association; Ben Bridges (absent)

All Present: Ivy C. Lewis, Southeastern Tank; Pat Valeja, Diversion Water Co.; Byron Braud, Dow Chemical Company; Amanda Laughlin, LDHH; Caryn Benjamin, LDHH

Overview of Meeting Discussions:

- Main discussion points at the subcommittee meeting primarily included discussions related to minor design requirements on finished water storage facilities. There were few (if any) items where there was significant disagreement with the requirements of the existing *Recommended Standards for Waterworks*.
- Significant time was spent discussing differences in each paragraph of Part 7 and whether the revised standards will be used as design standards for new and/or improved water system infrastructure, cited in the LDHH's sanitary surveys, or both. The subcommittee discussed each paragraph and attempted to classify each as a design standard or a sanitary survey requirement. The discussion had its origin in the so called "grandfathering" issue that the overall committee is and will be discussing at upcoming meetings.

Top Ten Subcommittee Recommendations:

The subcommittee advances the following specific changes in the current Part 7 requirements for consideration of the full committee.

- 7.0 The materials and designs used for finished water storage structures shall provide stability and durability as well as protect the quality of the stored water. Steel structures shall follow the **current AWWA standards (GLOBAL CHANGE BY LDHH LEGAL FOR REFERENCING OTHER STANDARDS)** concerning steel tanks, standpipes, reservoirs, and elevated tanks wherever they are applicable. Other materials of construction are acceptable when properly designed to meet the requirements of Part 7.

- 7.0.1.c Fire flow requirements established by the appropriate ~~state Insurance Services Office~~ Property Insurance Association of Louisiana (PIAL) should be satisfied where fire protection is provided.
- 7.0.6 Finished water storage designed to facilitate fire flow requirements and meet average daily consumption should be designed to facilitate turnover of water in the finished water storage to minimize stagnation and/or stored water age. Consideration ~~shall~~ should be given to separate inlet and outlet pipes, mechanical or similar mixing, or other acceptable means ~~to prevent to avoid stagnation and freezing.~~ Poor water circulation and long detention times that can lead to loss of disinfectant residual, microbial growth, formation of disinfectant byproducts, taste and odor problems, and other water quality problems.
- 7.0.7.c The overflow for an elevated tank shall open downward and be screened with a four mesh, non-corrodible screen ~~or mechanical device, such as a flap valve or duckbill valve,~~ to keep out animals or insects. The screen ~~shall~~ should be installed within the overflow pipe at a location least susceptible to damage by vandalism.
- 7.0.7.e ~~When a flapper or duckbill valve is used, a screen shall be provided inside the valve. In cold climates, use of a flapper or duckbill should be considered to minimize air movement and hence ice formation in the tank. In cold climates, provisions must be included to prevent the flapper or duckbill from freezing shut.~~
- 7.0.8.2.a Each manhole shall be elevated at least 24 inches above the top of the tank ~~or covering~~ and the finished grade of the surrounding ground, whichever is higher.
- 7.0.9.d shall, on ground-level structures, open downward with the opening at least 24 inches above the roof or ~~and the finished grade of the surrounding ground~~ and covered with twenty-four mesh non-corrodible screen. The screen shall be installed within the pipe at a location least susceptible to vandalism.
- 7.0.17.b Wax coatings for the tank interior shall not be used on new tanks. ~~Recoating with a wax system is strongly discouraged.~~ Old wax coating must be completely removed before using another tank coating.
- 7.0.18.a Finished water storage structures shall be disinfected in accordance with AWWA Standard C652. If bacteriological testing for coliform organisms is negative and chlorine residuals are at acceptable distribution system levels, , the storage tank may be placed into service. If such testing shows the presence of coliform bacteria, repeat samples shall be taken until two consecutive ~~or more successive sets of~~ samples, taken

at 24-hour intervals, are negative. ~~shall indicate microbiologically satisfactory water before the facility is placed into operation~~

7.0.19 Smooth-nosed sampling tap(s) or similar non threaded stainless steel sampling taps shall be provided to facilitate collection of water samples for both bacteriological and chemical analyses. The sample tap(s) shall be easily accessible.

7.2.1 The tank shall be located above normal ground surface ~~and be completely housed.~~

7.2.4 Each tank shall have an access manhole, a drain, and control equipment consisting of a pressure gauge, water sight glass, automatic or manual air blow-off, means for adding air, and pressure operated start-stop controls for the pumps. A pressure relief valve shall be installed and be capable of handling the full pumpage rate of flow at the pressure vessel design limit. Where practical the access manhole should be 24 inches in diameter.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY EXCEPT FOR SIGHT GLASS WHICH HAS EXISTING LDHH EXCEPTION IF AUTOMATED CONTROLS ARE PROVIDED TO MAINTAIN AIR & WATER. ADD THE SPECIFIC LDHH EXCEPTION HERE.

7.3.1 The maximum variation between high and low levels in storage structures providing pressure to a distribution system should not exceed 30 feet. The minimum working pressure in the distribution system ~~should~~ shall be 20 psi ~~35 psi (240 kPa)~~ and the normal working pressure should be approximately 60 to 80 psi ~~(410 – 550 kPa)~~. When static pressures exceed 100 psi ~~(690 kPa)~~, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system.

Subcommittee Recommendations (for committee deliberation):

The following information includes the subcommittee's recommendations concerning the application of the noted paragraph as a design standard for new/improved water system infrastructure, a deficiency that can be cited by the LDHH in the annual sanitary survey, or a combination thereof.

7.0 GENERAL

The materials and designs used for finished water storage structures shall provide stability and durability as well as protect the quality of the stored water. Steel structures shall follow the **current AWWA standards (GLOBAL CHANGE BY LDHH LEGAL FOR REFERENCING OTHER STANDARDS)** concerning steel tanks, standpipes, reservoirs, and elevated tanks wherever they are applicable. Other materials of construction are acceptable when properly designed to meet the requirements of Part 7.

7.0.1 Sizing

Storage facilities should have sufficient capacity, as determined from engineering studies, to meet domestic demands, and where fire protection is provided, fire flow demands.

- a. The minimum storage capacity (or equivalent capacity) for systems not providing fire protection shall be equal to the average daily consumption. This requirement may be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands of the system.

DESIGN STANDARD FOR NEW SYSTEMS; NOT ENFORCED ON SANITARY SURVEY.

- b. Excessive storage capacity should be avoided to prevent potential water quality deterioration problems.
- c. Fire flow requirements established by the appropriate ~~state Insurance Services Office~~ **Property Insurance Association of Louisiana (PIAL)** should be satisfied where fire protection is provided.

DESIGN STANDARD FOR NEW SYSTEMS; NOT ENFORCED ON SANITARY SURVEY.

7.0.2 Location of reservoirs

- a. The lowest elevation of the floor and sump floor of ground level reservoirs shall be placed above the 100 year flood elevation or the highest flood of record, whichever is higher, and at least two feet above the groundwater table. Sewers, drains, standing water, and similar sources of possible contamination must be kept at least 50 feet from the reservoir. Gravity sewers constructed of water main quality pipe, pressure tested in place without leakage, may be used at distances greater than 20 feet but less than 50 feet.

100 YEAR FLOOD ELEVATION DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS; NOT ENFORCED ON SANITARY SURVEY. ALL OTHER REQUIREMENTS OF 7.0.2.a ENFORCED ON SANITARY SURVEY.

- b. The bottom of ground level reservoirs and standpipes should be placed at the normal ground surface. If the bottom of a storage reservoir must be below the normal ground surface, at least 50 percent of the water depth must be above grade. The top of a partially buried storage structure shall not be less than two feet above normal ground surface. Clearwells constructed under filters may be exempted from this requirement when the design provides adequate protection from contamination.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.0.3 Protection from contamination

All finished water storage structures shall have suitable watertight roofs which exclude birds, animals, insects, and excessive dust. The installation of appurtenances, such as antenna, shall be done in a manner that ensures no damage to the tank, coatings or water quality, or corrects any damage that occurred.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.4 Protection from trespassers

Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage. Consideration should be given to the installation of high strength, cut resistant locks or lock covers to prevent direct cutting of a lock.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.5 Drains

No drain on a water storage structure may have a direct connection to a sewer or storm drain. The design shall allow draining the storage facility for cleaning or maintenance without causing loss of pressure in the distribution system.

**DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY.**

7.0.6 Stored Water Age

Finished water storage designed to facilitate fire flow requirements and meet average daily consumption should be designed to facilitate turnover of water in the finished water storage to minimize stagnation and/or stored water age. Consideration ~~shall~~ *should* be given to separate inlet and outlet pipes, *mechanical or similar* mixing, or other acceptable means ~~to prevent to avoid stagnation and freezing~~. Poor water circulation and long detention times *that* can lead to loss of disinfectant residual, microbial growth, formation of disinfectant byproducts, taste and odor problems, and other water quality problems.

**DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON
SANITARY SURVEY.**

7.0.7 Overflow

All water storage structures shall be provided with an overflow which is brought down to an elevation between 12 and 24 inches above the ground surface, and discharges over a drainage inlet structure or a splash plate. No overflow may be connected directly to a sewer or a storm drain. All overflow pipes shall be located so that any discharge is visible.

**DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY.**

- a. When an internal overflow pipe is used on elevated tanks, it should be located in the access tube. For vertical drops on other types of storage facilities, the overflow pipe should be located on the outside of the structure.

**DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY.**

- b. The overflow for a ground-level storage reservoir shall open downward and be screened with twenty-four mesh non-corrodible screen. The screen shall be installed within the overflow pipe at a location least susceptible to damage by vandalism.

**DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY.**

- c. The overflow for an elevated tank shall open downward and be screened with a four mesh, non-corrodible screen ~~or mechanical device, such as a flap valve or duckbill valve,~~ to keep out animals or insects. The screen ~~shall~~ should be installed within the overflow pipe at a location least susceptible to damage by vandalism.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- d. The overflow pipe shall be of sufficient diameter to permit waste of water in excess of the filling rate.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- e. ~~When a flapper or duckbill valve is used, a screen shall be provided inside the valve. In cold climates, use of a flapper or duckbill should be considered to minimize air movement and hence ice formation in the tank. In cold climates, provisions must be included to prevent the flapper or duckbill from freezing shut.~~

7.0.8 Access

Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. At least two (2) manholes shall be provided above the waterline at each water compartment where space permits.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY EXCEPT TWO ACCESS MANHOLES WHICH IS NOT ENFORCED ON SANITARY SURVEY.

7.0.8.1 Elevated Storage or Dome Roof Structures

- a. At least one of the access manholes shall be framed at least four inches above the surface of the roof at the opening. They shall be fitted with a solid water tight cover which overlaps the framed opening and extends down around the frame at least two inches, shall be hinged on one side, and shall have a locking device.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- b. All other manholes or access ways shall be bolted and gasketed according to the requirements of the reviewing authority, or shall meet the requirements of (a).

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.8.2 Ground Level or Flat Roof Structures

- a. Each manhole shall be elevated at least 24 inches above the top of the tank ~~or covering~~ sed the finished grade of the surrounding ground, whichever is higher.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- b. Each manhole shall be fitted with a solid water tight cover which overlaps a framed opening and extends down around the frame at least two inches. The frame shall be at least four inches high. Each cover shall be hinged on one side, and shall have a locking device.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.9 Vents

Finished water storage structures shall be vented. The overflow pipe shall not be considered a vent. Open construction between the sidewall and roof is not permissible. Vents:

- a. shall prevent the entrance of surface water and rainwater;
- b. shall exclude birds and animals;
- c. should exclude insects and dust, as much as this function can be made compatible with effective venting;
- d. shall, on ground-level structures, open downward with the opening at least 24 inches above the roof or ~~sed~~ the finished grade of the surrounding ground and covered with twenty-four mesh non-corrodible screen. The screen shall be installed within the pipe at a location least susceptible to vandalism;

- e. shall, on elevated tanks and standpipes, open downward, and be fitted with either four mesh non-corrodible screen, or with finer mesh non-corrodible screen in combination with an automatically resetting pressure-vacuum relief mechanism, as required by the reviewing authority.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY EXCEPT FINER MESH NON CORRODIBLE SCREEN ON 7.0.9.e.

7.0.10 Roof and sidewall

The roof and sidewalls of all water storage structures must be watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow. Particular attention shall be given to the sealing of roof structures which are not integral to the tank body.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- a. Any pipes running through the roof or sidewall of a metal storage structure must be welded, or properly gasketed. In concrete tanks, these pipes shall be connected to standard wall castings which were poured in place during the forming of the concrete. These wall castings should have seepage rings imbedded in the concrete.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- b. Openings in the roof of a storage structure designed to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent contamination from surface or floor drainage.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- c. Valves and controls should be located outside the storage structure so that the valve stems and similar projections will not pass through the roof or top of the reservoir.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- d. The roof of the storage structure shall be well drained. Downspout pipes shall not enter or pass through the reservoir. Parapets, or similar construction which would tend to hold water and snow on the roof, will not be approved unless adequate waterproofing and drainage are provided.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- e. The roof of concrete reservoirs with earthen cover shall be sloped to facilitate drainage. Consideration should be given to installation of an impermeable membrane roof covering.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- f. Reservoirs with pre-cast concrete roof structures must be made watertight with the use of a waterproof membrane or similar product.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.11 Construction Materials

The material used in construction of reservoirs shall be acceptable to the reviewing authority. Porous material, including wood and concrete block, are not suitable for potable water contact applications.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.12 Safety

Safety must be considered in the design of the storage structure. The design shall conform to pertinent laws and regulations of the area where the water storage structure is constructed.

- a. Ladders, ladder guards, balcony railings, and safely located entrance hatches shall be provided where applicable.
- b. Elevated tanks with riser pipes over eight inches in diameter shall have protective bars over the riser openings inside the tank.

- c. Railings or handholds shall be provided on elevated tanks where persons must transfer from the access tube to the water compartment.
- d. Confined space entry requirements shall be considered.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY. NEW STANDARDS SHALL HAVE SOME GLOBAL REFERENCE TO APPROPRIATE SAFETY REQUIREMENTS OR TO OTHER CODES (OSHA, ETC.)

7.0.13 Freezing

Finished water storage structures and their appurtenances, especially the riser pipes, overflows, and vents, shall be designed to prevent freezing which will interfere with proper functioning. Equipment used for freeze protection that will come into contact with the potable water shall meet ANSI/NSF Standard 61 or be approved by the reviewing authority. If a water circulation system is used, it is recommended that the circulation pipe be located separately from the riser pipe.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.0.14 Internal catwalk

Every catwalk over finished water in a storage structure shall have a solid floor with sealed raised edges, designed to prevent contamination from shoe scrapings and dirt.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.15 Silt stop

The discharge pipes from water storage structures shall be located in a manner that will prevent the flow of sediment into the distribution system. Removable silt stops should be provided.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.16 Grading

The area surrounding a ground-level structure shall be graded in a manner that will prevent surface water from standing within 50 feet of it.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.0.17 Painting and/or cathodic protection

Proper protection shall be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both.

- a. Paint systems shall meet ANSI/NSF standard 61 and be acceptable to the reviewing authority. Interior paint must be applied, cured, and used in a manner consistent with the ANSI/NSF approval. After curing, the coating shall not transfer any substance to the water which will be toxic or cause taste or odor problems. Prior to placing in service, an analysis for volatile organic compounds is advisable to establish that the coating is properly cured. Consideration should be given to 100 % solids coatings.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- b. Wax coatings for the tank interior shall not be used on new tanks. ~~Recoating with a wax system is strongly discouraged.~~ Old wax coating must be completely removed before using another tank coating.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- c. Cathodic protection should be designed and installed by competent technical personnel, and a maintenance contract should be provided.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.0.18 Disinfection

- a. Finished water storage structures shall be disinfected in accordance with AWWA Standard C652. If bacteriological testing for coliform organisms is negative and chlorine residuals are at acceptable distribution system levels, , the storage tank may be placed into service. If such testing shows the presence of coliform bacteria, repeat samples shall be taken until two consecutive or more successive sets of samples, taken at 24-hour intervals, are negative. shall indicate microbiologically satisfactory water before the facility is placed into operation

***DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY AS APPROPRIATE.***

- b. Disposal of heavily chlorinated water from the tank disinfection process shall be in accordance with the requirements of the state regulatory agency.

***DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY AS APPROPRIATE.***

- c. The disinfection procedure specified in AWWA Standard C652 chlorination method 3, section 4.3 which allows use of the highly chlorinated water held in the storage tank for disinfection purposes, is not recommended. The chlorinated water may contain various disinfection by-products which should be kept out of the distribution system.

***DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY AS APPROPRIATE.***

If this procedure is used, it is recommended that the initial heavily chlorinated water be properly disposed.

***DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY SURVEY AS APPROPRIATE.***

7.0.19 Provisions for sampling

Smooth-nosed sampling tap(s) ***or similar non threaded stainless steel sampling taps*** shall be provided to facilitate collection of water samples for both bacteriological and chemical analyses. The sample tap(s) shall be easily accessible.

***DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON
SANITARY***

7.1 TREATMENT PLANT STORAGE

The applicable design standards of Section 7.0 shall be followed for plant storage.

7.1.1 Filter washwater tanks

Filter washwater tanks shall be sized, in conjunction with available pump units and finished water storage, to provide the backwash water required by Section 4.3.1.11. Consideration must be given to the backwashing of several filters in rapid succession.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.1.2 Clearwell

Clearwell storage should be sized, in conjunction with distribution system storage, to relieve the filters from having to follow fluctuations in water use.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- a. When finished water storage is used to provide disinfectant contact time (see Section 4.4.2) special attention must be given to tank size and baffling. (See Section 7.1.2.b below).

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- b. To ensure adequate disinfectant contact time, sizing of the clearwell should include extra volume to accommodate depletion of storage during the nighttime for intermittently operated filtration plants with automatic high service pumping from the clearwell during non-treatment hours.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- c. An overflow and vent shall be provided.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

- d. A minimum of two clearwell compartments shall be provided.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.1.3 Adjacent storage

Finished or treated water must not be stored or conveyed in a compartment adjacent to untreated or partially treated water when the two compartments are separated by a single wall, unless approved by the reviewing authority.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.1.4 Other treatment plant storage tanks

Unless otherwise allowed by the reviewing authority, other treatment plant storage tanks/basins such as detention basins, backwash reclaim tanks, receiving basins and pump wet-wells for finished water shall be designed as finished water storage structures.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.2 HYDROPNEUMATIC TANK SYSTEMS

Hydropneumatic (pressure) tanks, when provided as the only water storage are acceptable only in very small water systems. Systems serving more than 150 living units should have ground or elevated storage designed in accordance with Section 7.1 or 7.3. Hydropneumatic tank storage is not to be permitted for fire protection purposes. Pressure tanks shall meet ASME code requirements or an equivalent requirement of state and local laws and regulations for the construction and installation of unfired pressure vessels. Non-ASME, factory-built hydropneumatic tanks may be allowed if approved by the reviewing authority.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.2.1 Location

The tank shall be located above normal ground surface ~~and be completely housed.~~

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.2.2 System sizing

- a. The capacity of the wells and pumps in a hydropneumatic system should be at least ten times the average daily consumption rate.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- b. The gross volume of the hydropneumatic tank, in gallons, should be at least ten times the capacity of the largest pump, rated in gallons per minute. For example, a 250 gpm pump should have a 2,500 gallon pressure tank, unless other measures (e.g., variable speed drives in conjunction with the pump motors) are provided to meet the maximum demand.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- c. Sizing of hydropneumatic storage tanks must consider the need for disinfectant contact time.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

7.2.3 Piping

The hydropneumatic tank(s) shall have bypass piping to permit operation of the system while the tank is being repaired or painted.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.2.4 Appurtenances

Each tank shall have an access manhole, a drain, and control equipment consisting of a pressure gauge, water sight glass, automatic or manual air blow-off, means for adding air, and pressure operated start-stop controls for the pumps. A pressure relief valve shall be installed and be capable of handling the full pumpage rate of flow at the pressure vessel design limit. Where practical the access manhole should be 24 inches in diameter.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY EXCEPT FOR SIGHT GLASS WHICH HAS EXISTING LDHH EXCEPTION IF AUTOMATED CONTROLS ARE PROVIDED TO MAINTAIN AIR & WATER. ADD THE SPECIFIC LDHH EXCEPTION HERE.

7.3 DISTRIBUTION SYSTEM STORAGE

The applicable design standards of Section 7.0 shall be followed for distribution system storage.

7.3.1 Pressures

The maximum variation between high and low levels in storage structures providing pressure to a distribution system should not exceed 30 feet. The minimum working pressure in the distribution system should be ~~20 psi 35 psi (240 kPa)~~ and the normal working pressure should be approximately 60 to 80 psi ~~(410 – 550 kPa)~~. When static pressures exceed 100 psi ~~(690 kPa)~~, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY. MINIMUM PRESSURE SHALL BE SAME AS REFERENCED IN OTHER PARTS OF NEW STANDARDS.

7.3.2 Drainage

Finished water storage structures which provide pressure directly to the distribution system shall be designed so they can be isolated from the distribution system and drained for cleaning or maintenance without causing a loss of pressure in the distribution system. The storage structure drain shall discharge to the ground surface with no direct connection to a sewer or storm drain.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, ALSO ENFORCED ON SANITARY SURVEY.

7.3.3 Level controls

Adequate controls shall be provided to maintain levels in distribution system storage structures. Level indicating devices should be provided at a central location.

- a. Pumps should be controlled from tank levels with the signal transmitted by telemetering equipment when any appreciable head loss occurs in the distribution system between the source and the storage structure.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- b. Altitude valves or equivalent controls may be required for a second and subsequent structures on the system.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.

- c. Overflow and low-level warnings or alarms should be located where they will be under responsible surveillance 24 hours a day.

DESIGN STANDARD FOR NEW SYSTEMS AND/OR IMPROVEMENTS, NOT ENFORCED ON SANITARY SURVEY.